EFFECTS OF THE VENUS GROUND AMBIENT ENVIRONMENT ON MATERIALS

LINDA DEL CASTILLO*, JAMES POLK, MIKE PAUKEN, AND ELIZABETH KOLAWA

Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Pasadena, California 91109, USA
e-mail: Linda.DelCastillo@jpl.nasa.gov

ABSTRACT

Due to their unique characteristics, the Venus lower atmosphere and ground ambient environments provide particularly challenging conditions for materials. Such conditions include an ambient temperature of 470°C an ambient pressure of 92 bars and an atmospheric composition of 96.5% CO2+3.5% N2 + trace gases at levels ≤ a few 10s of ppm. To address these challenges and to mitigate the risk of failure due to material degradation resulting from interactions with the Venus ground ambient, a Venus Materials Test Facility (VMTF) that is capable of simulating measured Venus surface ambient conditions, including temperature, pressure and chemical composition has been developed. This work describes the test methodology developed as well as the results of preliminary evaluations performed on a variety of materials and small subsystems. Pre-exposure and post-exposure analyses for all materials included gravimetric measurements, optical microscopy of the material surface, and scanning electron microscopy as needed. Application specific properties were also included in the evaluation.